

Small Form Factor Bi-Directional Transceiver Module for Fast Ethernet, ATM, SONET OC-3/SDH STM-1



FEATURES

- RoHS compliant
- 2x5 Pin SFF Package with SC Receptacle
- Single Mode Fiber, Bi-Directional Transmission with 1310nm Transmitter and 1550nm Receiver
- Link Distance up to 15km
- Single +3.3V power supply and PECL logic interface
- Wave Solderable and Aqueous Washable
- Bellcore GR-468 compliant
- Laser Class 1 Product which comply with the requirements of IEC 60825-1 and IEC 60825-2

Description

DELTA's SFF Bi-Directional transceiver is designed for point-to-point Bi-Directional Optical Network transmission. The module consists multiple quantum well laser, InGaAs PIN, Preamplifier and WDM filter in a high-integrated optical sub-assembly, and it receives up to 155Mbps of continuous data at 1550nm, and transmits 155Mbps of continuous data at 1310nm.

The module is contained in a 2x5 SFF industry standard package with a SC receptacle connector, and support LVTTTL transmitter disable input, LVPECL electrical signal Interface and receiver signal detect output.

Application

- TTC TS-1000
- ITU-T G.985
- IEEE 802.3ah 100BASE-BX/ Fast Ethernet
- SONET OC-3/SDH STM-1/ ATM Network
- FTTx Broadband Access System

Performance

- SFBD-155E2J1RM data link up to 15km in 9/125um single mode fiber.

1. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40		85	°C	
Storage Ambient Humidity	HA	5		95	%	
Power Supply Voltage	V _{CC}	-0.5		5	V	
Signal Input Voltage		-0.3		V _{CC} +0.3	V	
Optical Input Power (Peak)				0	dBm	
Lead Soldering Temperature	T _{SOLD}			260	°C	
Lead Soldering Time	t _{SOLD}			10	sec	

2. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Ambient Operating Temperature	T _A	0		70	°C	Without air flow
Ambient Humidity	HA	5		85	%	Non-condensing
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}			230	mA	
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz
Data Rate		10		155.52	Mbps	
Transmission Distance				15	km	

3. Optical Specification of Transmitter

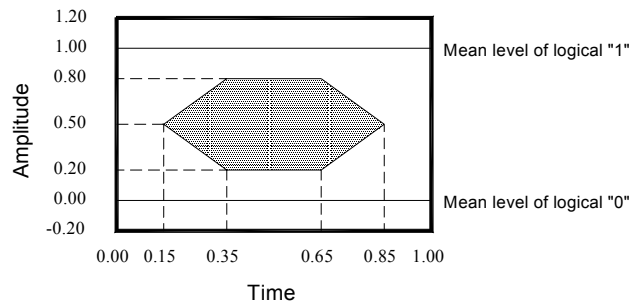
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Launched Power	P _O	-14	-11	-8	dBm	Note (1)
Launched power (Peak.)				-5	dBm	
Extinction Ratio	ER	8.5			dB	
Center Wavelength	λ _c	1260	1310	1360	nm	
Spectrum Width (RMS)	σ			6	nm	
Optical Rise/Fall Time	t _r /t _f			1.3	ns	Note (2)
Total Jitter	t _j			1	ns	Note (3)
Optical Transmitter Reflectance				-14	dB	
Optical Return Loss Tolerance	ORLT			14	dB	
Relative Intensity Noise	RIN			-116	dB/Hz	
Output Eye Mask	Compliant with Bellcore TR-NWT-000253 and ITU recommendation G.957					Note (4)

Note (1). Launched power (avg.) is power coupled into a 9/125um single mode fiber.

Note (2). These are unfiltered 20-80% values.

Note (3). Measure at 2²³-1 NRZ PRBS pattern.

Note (4). Eye Mask definition



Optical Pulse Mask with Bessel Filter Specified in ITU-T G.957

4. Optical Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1480		1600	nm	
Receiver Sensitivity	P_{IN}			-30	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	-3			dBm	
Signal Detect -Assert Power	P_A	-		-30	dBm	
Signal Detect -Deassert Power	P_D	-44			dBm	Note (2)
Signal Detect Hysteresis	P_A-P_D	0.5	2.5	6	dB	
Optical Receiver Reflectance				-14	dB	Note (3)
Output Data Rise/Fall time	t_r/t_f			1.5	ns	Note (4)
S/X Endurance				10	dB	Note (5)
Optical Isolation		25			dB	Note (6)

Note (1). Measured with 1520nm, ER=10dB; BER = $<10^{-10}$ @ PRBS=2²³-1 NRZ

Note (2). When SD deasserted, the data output is Low-level (fixed)

Note (3). When the terminal is viewed from the optical path, the reflection toward the optical path of the optical signal with a central wavelength of 1480nm to 1580nm transmitted to terminal.

Note (4). These are 20%~80% values

Note (5). X=10 MHz, Rectangular BER = 10^{-10}

Note (6). Receiver isolation between 1260nm ~1360nm

5. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I_{CC}			A	mA	Note (1)
Differential line input Impedance	R_{IN}	80	100	120	Ohm	
Differential Data Input Swing	V_{DT}	300		1600	mV _{p-p}	
Data Input Voltage- High	$V_{IH}-V_{CC}$	-1.165		-0.880	V	LVPECL
Data Input Voltage- Low	$V_{IL}-V_{CC}$	-1.810		-1.475	V	
Transmitter Disable Input-High	V_{DISH}	2		$V_{CC}+0.3$	V	LVTTTL
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Receiver						
Total Supply Current	I_{CC}			B	mA	Note (1)
Differential Data Output Swing	V_{DR}	400		2000	mV _{p-p}	
Data Output Voltage-High	$V_{OH}-V_{CC}$	-1.085		-0.880	V	LVPECL
Data Output Voltage-Low	$V_{OL}-V_{CC}$	-1.830		-1.555	V	
Signal Detect Output Voltage-High	$V_{OH}-V_{CC}$	-1.085		-0.880	V	
Signal Detect Output Voltage-Low	$V_{OL}-V_{CC}$	-1.830		-1.555	V	

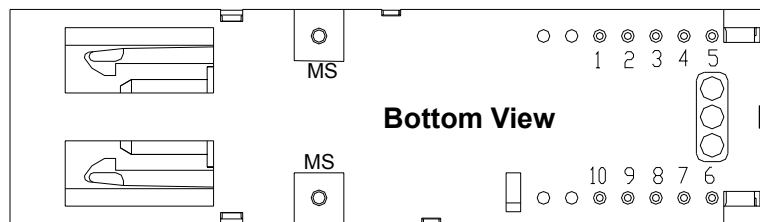
Note (1). A (TX)+ B (RX) = 230mA

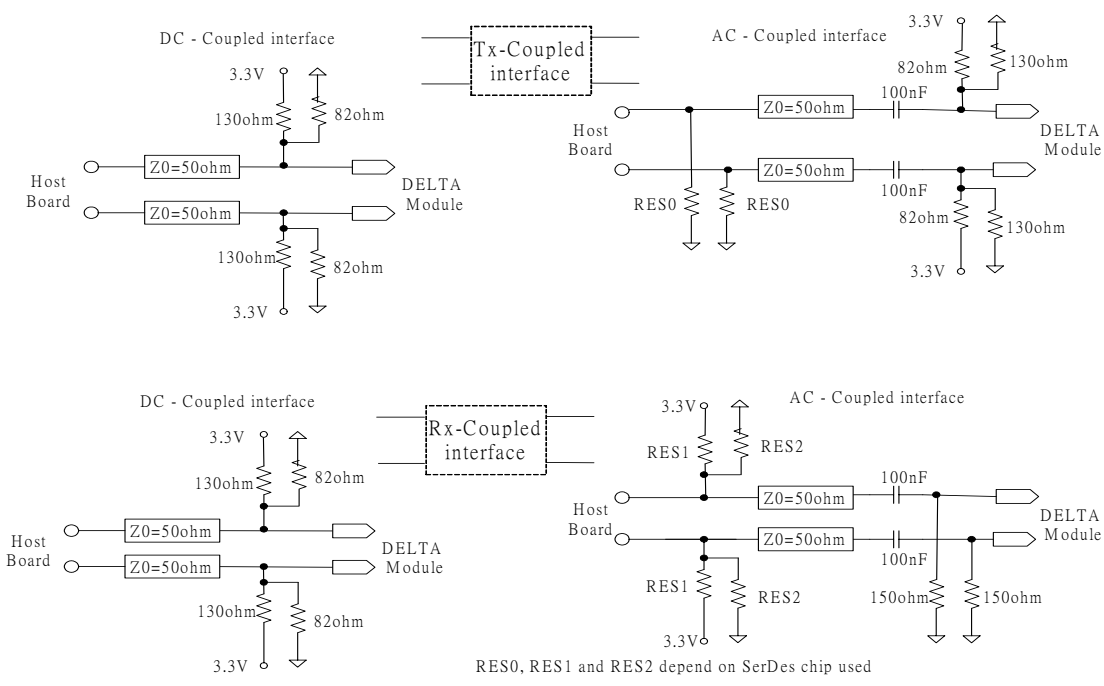
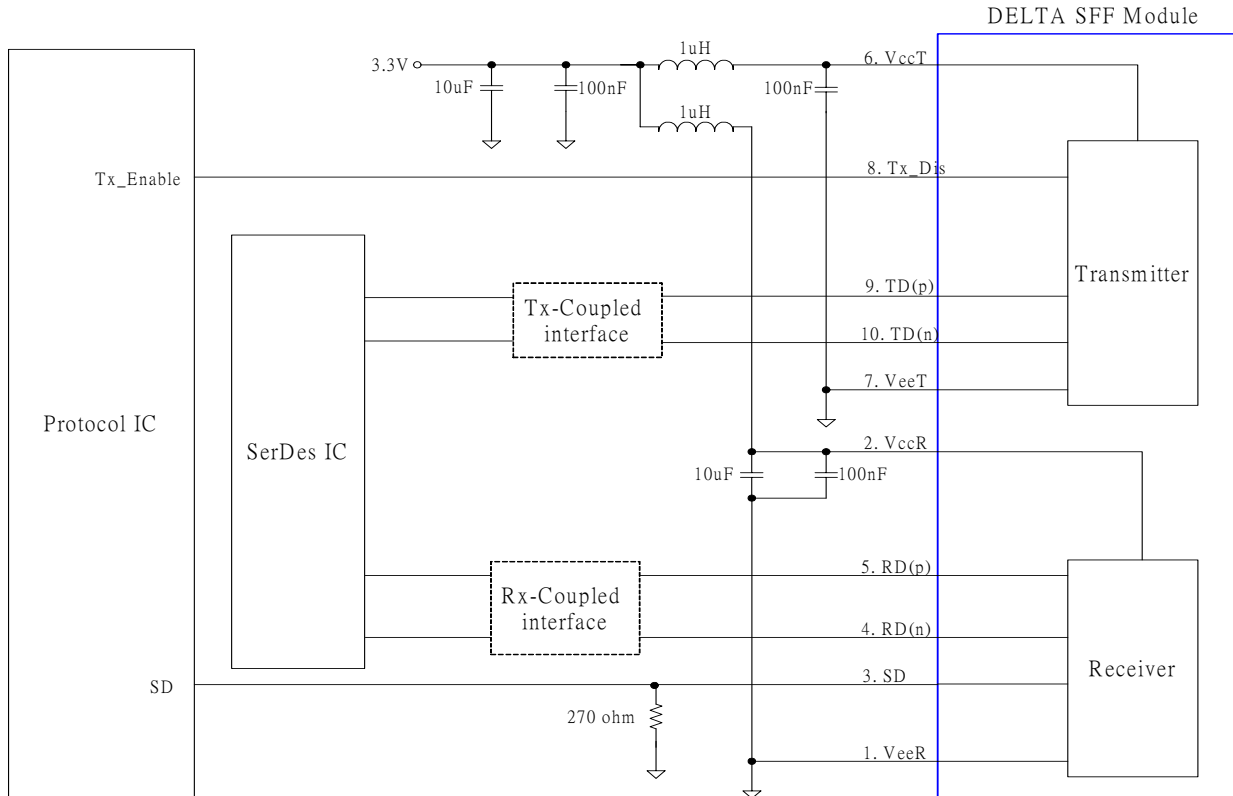
(A: Not include termination circuit; B: using a resistor of 150Ω between Data-output and ground)

6. Pin Description

Tx/Rx	Pin No.	I/O	Pin Name	Description
Rx	1		VeeR	Receiver Ground
	2		VccR	+3.3V Receiver Power Supply
	3	O	SD	Normal Optical Input indicated by logic "High", and No Optical Input indicated by logic "Low".
	4	O	RD(n)	Inverted Receiver Data Output
	5	O	RD(p)	Non-Inverted Receiver Data Output
Tx	6		VccT	+3.3V Transmitter Power Supply
	7		VeeT	Transmitter Ground
	8	I	Tx_Dis	LVTTL Logic "High" to Disable Transmitter, and Enable Transmitter by Logic "Low" or "Open".
	9	I	TD(p)	Non-Inverted Transmitter Data Input
	10	I	TD(n)	Inverted Transmitter Data Input
			MS	Mounting studs/ connect this pin to Chassis ground

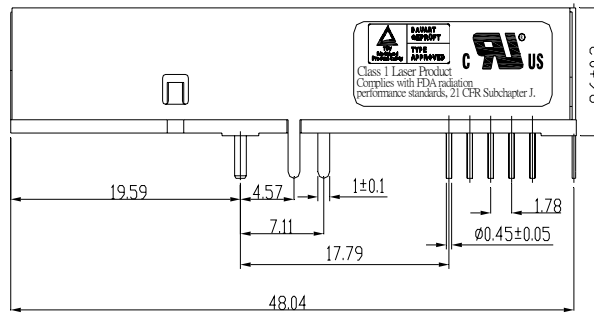
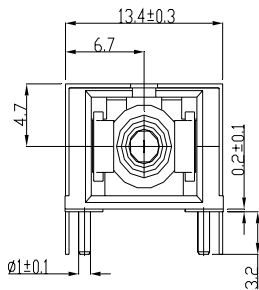
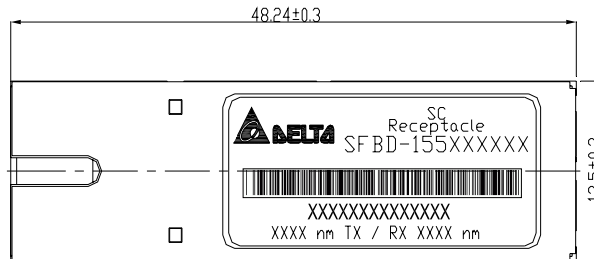
Note. EMI shielding lead must be connected to Signal ground



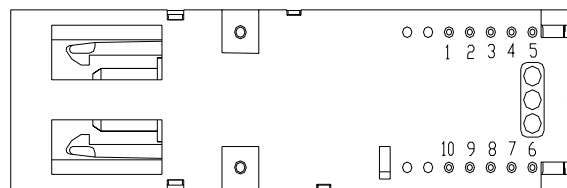
7. Recommended Interface Circuit


8. Outline Dimensions

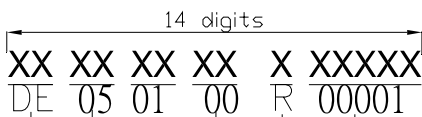
Parameter	Unit	Description	Note
Mechanical Dimensions	mm	48.3x13.5x9.6	
Connector Type	-	SC connector	IEC-61754-4



NOTE:
 1.UNITS IN mm
 2.DIMENSIONAL TOLERANCES ±0.2



S/ N



S/N : (00001~99999)
 Rework : Rework=R or No-rework=0
 Vender NOTE : Free or 00
 Week (52Weeks/Year) : 1月2日=01
 Year : 2005=05
 Vender CODE : DELTA=DE

9. Regulatory Compliance

Feature	Test Method	Reference	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	Human Body Model (HBM)	MIL-STD-883E Method 3015.7 EIA-JESD22-A114	(1) Satisfied with electrical characteristics of product spec. (2) No physical damage
	Machine Model (MM)	EIA-JESD22-A115	
Electrostatic Discharge (ESD) to the Simplex Receptacle	Contact Discharge	IEC/EN 61000-4-2	
	Air Discharge	IEC/EN 61000-4-2	
Radio Frequency Electromagnetic Field Immunity		IEC/EN 61000-4-3	
Electromagnetic Interference (EMI)		FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	
Laser Eye Safety	FDA/CDRH	FDA 21CFR 1040.10, 1040.11	CDRH File # 0420993
	TUV	IEC/EN 60825-1 IEC/EN 60825-2	TUV Certificate # R50032471
Component Recognition	TUV	IEC/EN 60950	
	UL/CSA	UL 60950	UL File # E239394

Appendix A. Document Revision

Version No.	Date	Description
S0	2006-12-20	Preliminary Datasheet